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ABSTRACT

The report reviews 86 documents (1966 to 1982) concerned with trends and applications of computers in vocational rehabilitation of the disabled. The literature is analyzed in four areas: the counseling process, agency management, training and education, and consumer concerns. Six recommendations resulting from the reviews are given such as the need for a study of the usefulness of existing computer-based occupational information systems in rehabilitation programs, the need to motivate vocational rehabilitation agency personnel to utilize desktop computers to assist in agency management activities, and the need for training rehabilitation personnel in computer sciences and information management. The annotated reference list is organized alphabetically by author within each of the four areas and includes information on title, source, date, publisher, and brief non-evaluative annotation. (DB)

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COMPUTERS IN VOCATIONAL REHABILITATION: CURRENT TRENDS AND FUTURE APPLICATIONS

17

Bruce Growick, Ph.D.

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Bruce Growick, Ph.D.

Assistant Professor
Human Services Education
Ohio State University

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REHABILITATION RESEARCH REVIEW

Computers in Vocational Rehabilitation: Current Trends and Future Applications

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REHABILITATION RESEARCH REVIEW

PROJECT SUMMARY

> "...Synthetic research involves reviewing the research literature available in some defined area of interest and summarizing and integrating the results into tentative conclusions regarding the current state of knowledge..."
>
> (Bolton, 1974, p.10)

The REHABILITATION RESEARCH REVIEW project originates from the National Rehabilitation Information Center's (NARIC) 1983, National Institute of Handicapped Research (NIHR) contract. To assure quality research and the maximum participation of professionals in the field of rehabilitation, NARIC invited the National Council on Rehabilitation Education (NCRE) to serve as the project's co-sponsor.

REHABILITATION RESEARCH REVIEWS were initiated to create state-of-the-art reviews on a variety of rehabilitation topics.

Each of the REVIEWS consists of two parts:

- an integrated, analytical literature synopsis, including the author's observations, conclusions, and recommendations for future research; and
- an annotated reference list, including annotated bibliographic entries.

Each REHABILITATION RESEARCH REVIEW represents the individual author's opinions and not necessarily those of NARIC, NCRE or NIHR.

Bolton, B. Introduction to Rehabilitation Research. Springfield, IL: Charles C. Thomas, 1974.

However, this type of synoptic research provides professionals with an opportunity to reflect upon the strengths and weaknesses of the research available in each subject area, and thus, offers valuable feedback to NIHR as well as to the larger rehabilitation community.

This project also stands as a model of cooperative efforts. The co-sponsorship between NARIC and NCRE strengthened the substantive value of each of the final documents. The printing contribution by The Xerox Corporation greatly increased the dissemination possibilities for the entire project. Xerox's donation of services to REHABILITATION RESEARCH REVIEWS demonstrates the Corporation's continuing dedication to active involvement in public sector projects.

These collaborative efforts are important because of the intrinsic value of the project. Each REHABILITATION RESEARCH REVIEW takes a new step in the utilization of available research. The sheer volume of research studies conducted as well as the variety of publication sources can make the use of this information a complex and time consuming process. By closing the gap between the producers and consumers of knowledge and technology, it is hoped that REHABILITATION RESEARCH REVIEWS will help to avoid duplication of research efforts and will significantly add to the possibility for innovative applications of research information.

THE NATIONAL REHABILITATION INFORMATION CENTER

The National Rehabilitation Information Center, NARIC, is a rehabilitation research library located at The Catholic University of America (CUA) and funded by The National Institute of Handicapped Research, (NIHR), of the U.S. Department of Education. Established in 1977, NARIC's goals are to:

- Facilitate dissemination of rehabilitation information;
- Promote utilization of rehabilitation research;
- Serve as an archive for NIHR and Rehabilitation Services Administration (RSA) documents; and
- Make information on assistive devices available to professionals serving disabled persons, researchers, and disabled consumers.

In sponsoring the REHABILITATION RESEARCH REVIEW, NARIC's responsibilities included identifying and selecting authors; developing author guidelines; providing each author with topical bibliographic searches of REHABDATA and other relevant databases, as well as supplying a variety of supplemental resources. NARIC staff wrote citations and annotations and supplemental materials for each document in addition to serving as editor and publisher.

NARIC will house and distribute the REHABILITATION RESEARCH REVIEW documents.

THE NATIONAL COUNCIL ON REHABILITATION EDUCATION

The National Council on Rehabilitation Education (NCRE), is a professional organization composed of over 500 educators, trainers, and staff development specialists which represents over 180 academic training programs and research projects related to the field of rehabilitation education. NCRE is dedicated to quality services for persons with disabilities, ensured by high standards of pre-professional education, continuing education for practicing rehabilitationists, and ethical standards. The organization also lobbies on behalf of enabling legislation and supports mechanisms needed to maintain quality services such as accreditation, certification, professional literature, and the like.

Participation in the REHABILITATION RESEARCH REVIEW Project provided NCRE members an opportunity to further their organizational goal of "utilization and application of rehabilitation research." NCRE authors and members of the Advisory Committee volunteered their time and expertise to the project.

Dr. Kenneth W. Reagles, NCRE Advisory Committee Chair, assisted the NARIC REHABILITATION RESEARCH REVIEW Project Director with selection of topics and authors, as well as consulting with authors regarding substantive research issues. The NCRE Advisory Committee provided a peer review of the final documents.

THE NATIONAL INSTITUTE OF HANDICAPPED RESEARCH

The National Institute of Handicapped Research (NIHR), a part of the Office of Special Education and Rehabilitation Services of the U.S. Department of Education, provides leadership and support for a national and international program of comprehensive and coordinated research regarding the rehabilitation of disabled persons. The Institute's mission also encompasses the dissemination of information concerning developments in rehabilitation procedures, methods and devices to improve the lives of persons of all ages with physical and mental disabilities, especially those who are severely disabled.

The Institute carries out its mission through a variety of programs including:

- The Research and Demonstration Project
- The Research and Training Centers
- The Rehabilitation Engineering Centers

The REHABILITATION RESEARCH REVIEW project is a component part of the Institute's goal of transforming research knowledge into comprehensive documents for dissemination and utilization. Thus, NIHR funded NARIC to develop and implement the REVIEW project. NIHR staff specialists provided a review of the documents prior to publication. Additionally, in the continuing effort for coordination and cooperation among federal agencies, staff specialists from the Rehabilitation Services Administration (RSA) also participated in reviewing the documents.

COMPUTERS IN VOCATIONAL REHABILITATION: CURRENT TRENDS
AND FUTURE APPLICATIONS

COMPUTERS IN VOCATIONAL REHABILITATION: CURRENT TRENDS AND FUTURE APPLICATIONS

Bruce Growick, Ph.D.

Assistant Professor
Human Services Education
The Ohio State University

INTRODUCTION

The author, with the assistance of the National Rehabilitation Information Center, critically reviewed the literature on the use of computers in the field of vocational rehabilitation. Sources consulted were ERIC, Psychological Abstracts, Mediars, Dissertation Abstracts International, Social Science Citation Index, National Technical Information Service, and the Archives of Physical Medicine and Rehabilitation. A total of 86 documents were reviewed by the author and are included in the annotated reference list. Four major themes emerged which concerned the use of computers in:

Counseling Process

Facilitating the work of the counselor or client in the vocational rehabilitation process;

The author would like to extend his appreciation to Linda Davis and Linda O'Connor of The Ohio State University who assisted in developing the abstracts for this study. Also, Susan Flowers and Sharon McFarland at NARIC deserve acknowledgement for their assistance in preparing this manuscript.

Agency Management

Assisting supervisory/management personnel with program maintenance;

Training and Education

Improving the learning systems for disabled persons and/or the personnel who work with them;

Consumer Concerns

Applications to facilitate independent living options for disabled persons.

After summarizing the available literature within the framework of these categories, this REVIEW identifies and discusses some future applications for computers in vocational rehabilitation.

Acknowledging the tremendous capacity of computers to process, store, retrieve and transmit information, the vocational rehabilitation system in America is beginning to appreciate the variety of advantages available from computer use. Some of these advantages are demonstrated by computerized occupational information systems, computer-assisted interpretation of psychometric data, communication and robotic aids, wheelchair control systems, computer-assisted interactive courseware and computer-generated models of service delivery management. These computer-related activities are helping the vocational rehabilitation system to increase its effectiveness and its efficiency. Clearly, the increasing use and availability of computers assures that their impact will be felt throughout the field of rahabilitation.

Counseling Process

A key component in the counseling process is the enhancement of the counselor and the client's problem-solving ability relative to the goal of rehabilitation. The use of computers in this process is a relatively new phenomenon. Nevertheless, the literature reveals that all clinical aspects of the counseling process are affected: client assessment, treatment planning and selection, as well as treatment plan documentation and update. Seventeen documents addressed the use of computers in the counseling process.

Seven documents dealt with the use of computers in the interpretation of psychological and vocational tests. In this case, the computer assists the counselor in administering and interpreting psychometric instruments. Examples of this use include the development of voice-operated response units that record the oral responses to psychological tests for persons with impaired hand function (e.g., Richards, Wilson, Fine, & Rogers; and Taylor, 1970); instruments to measure aptitudes of blind persons (e.g., Bax, 1982); the generation of clinical diagnosis (Spitzer & Endicot, 1974); and the scoring of psychological assessment devices (Fowler, 1966).

The computer has also been used for the storage and retrieval of detailed diagnostic information on clients, such as manual capabilities and limitations (e.g., Computer Weekly, 1979); quantitative evaluations of sensory, perceptual, and cognitive processes (e.g., Roy, 1977); patient histories, observations, medical and other records, (e.g., Stephenson, 1976); and specific diagnoses (e.g., Gandy, 1979). These

generalized systems of information retrieval allow counselors to rapidly obtain and assess information required for client management in the rehabilitation process.

Six documents discussed computerized occupational information systems in rehabilitation and how they assist in potential job placement. A computerized program (Kruger, 1980) facilitates the vocational counselor's ability to synthesize information by producing probabilities of job satisfactoriness based on an individual's vocational abilities and the ability requirements of various occupational environments. Occupational information is stored in the computer from which probability statements are developed.

Recent technology in vocational rehabilitation also includes computerized occupational information systems for particular disabilities (e.g., Rose, 1976) and provides methods for enhancing job seeking skills, especially for severely disabled individuals (e.g., Mallik & Sprinkle, 1977).

These documents on the use of computers in the counseling process provide a resource for rehabilitation counselors engaged in vocational planning. Most documents provide a general description of the computerized system/method, as well as discussing the issues and concerns relative to their development.

Agency Management

Most vocational rehabilitation agencies have used computers for many years to compile information and statistics for reports. These reports

are provided either to the federal government (e.g., the R-300) or an independent accrediting agency (e.g., the Commission on Accreditation of Rehabilitation Facilities). It is, however, only recently that the state/federal vocational rehabilitation system in specific, and facilities/agencies in general, have used computers to manage the system more effectively and efficiently. In many ways (Eighth Institute on Rehabilitation Issues, 1981), the computer has already improved the management and delivery of rehabilitation resources.

The computer is used daily by some agencies to collect, store, retrieve, and manage client, personnel and physical facilities information (Bartholomew, 1982). In checking counselor performance and client/case service velocity (i.e., the speed with which a client moves through the process) the computer can report all case service activity for any unit within the system (e.g., client, counselor, office, or the entire agency). Such information, updated weekly or monthly, provides invaluable insight on what agency objectives are being met and where existing resources should be applied. Automated management systems are quickly becoming a part of the field of vocational rehabilitation (e.g., Warren, Smith, & Lehmann, 1982).

Additionally, computer simulation has been applied to generating models of service delivery so that management can speculate on how to change their existing services to better meet consumers' needs (e.g., Senn, 1978). Simulation provides a technique for conducting experiments on a computer to determine the effects of changes in parts of the system on the system as a whole. The technique involves mathematical and

logical models that describe the behavior of a system over a period of time. For managerial personnel who must balance the interdependencies of a system, the computer can analyze the direct and indirect consequences of changes to a system. Frequently, by computer simulation, management can isolate the principal causes of inefficiencies and bottlenecks to improve the functioning of the system.

Training and Education

Thirty-six documents reported information on the usefulness of computers for training and education purposes. Most documents (22) in this category dealt with specific uses of computer-assisted instruction (CAI) and computer-managed instruction (CMI) for disabled learners.

The benefits of learning with computers have been dramatic for disabled individuals whose physical limitations were previously a barrier to education. Computer-based learning systems have been used by persons with visual disabilities (e.g., Perera & Cobb, 1978); persons with hearing impairments (e.g., LeCavalier, 1982); emotionally impaired individuals (e.g., Haberman, 1977); and persons with learning disabilities (e.g., Crowther, 1982). Various approaches such as multisensory information, repetition, and rapid change have been incorporated for learners with short attention spans. Two documents describe a non-traditional alternative to classroom instruction which employed a computer-generated telephone transmission system to serve persons who were either homebound or hospitalized. Computer-assisted instructional techniques have also facilitated learning in such

rehabilitation-related training areas as reading and spelling (e.g., Gracke, 1981; Hasselbring & Crossland, 1982), making change and money management (e.g., Hallworth & Breiiner, 1980), and nutrition education (e.g. Katz, Johnson & Dolby, 1981). Yet, some writers believe that the broad range of the computer's potential uses in training and education has not been fully developed and implemented (Aeschleman & Tawney, 1978).

Nine documents reported evaluations of the effectiveness of CAI and CMI (e.g., Lally, 1981) with disabled learners. The majority of the studies used a pre- and post-test method of evaluation. The major finding showed that computer-assisted instruction aided short-term retention (e.g., Knutson & Prochnow, 1970). However, it is not clear how long the effects last or whether they actually have a significant impact on the education and training of persons with specific types of disabling conditions (e.g., Geoffrion & Goldenberg, 1981). Prototype programs were used almost exclusively to test and provide training in various academic and vocational areas (e.g., Wilson & Fox, 1982). No documents reported follow-up studies on the evaluation of specific advantages and disadvantages of computer use in the training and education of disabled individuals.

The remaining thirteen documents discussed a variety of issues, topics, and devices related to the training and education of disabled individuals or people who work with disabled individuals. Some documents discussed barriers to implementation in the field of special education (e.g., Schiffman, 1982); diagnostic systems to assist

educators in the assessment of disabled individuals, specifically learning disabled persons (e.g., Calbourn, 1982); recent technological trends such as the portable battery-operated computer (Foulds, 1982); and ancillary training techniques (Rehabilitation Group, 1980).

Consumer Concerns

Many computer applications meet the day-to-day needs of disabled individuals. As Vanderheiden (1982) so aptly states, "Disabled people also need to use the same programs and accomplish the same tasks as anyone else ... [computers] must help disabled persons perform tasks denied to them because of their disability" (p. 136). The appropriate combination of applications and equipment can offer disabled individuals another opportunity. In particular, computers are being used to assist in ambulation for spinal-cord injured persons (James, 1982), speech recognition for deaf persons (Craig, 1982), voice generation for individuals with communication disabilities (Carlson, Granstrom, & Hunnicut, 1982), and control of the environment for homebound individuals (Cronk & Schubert, 1981). Therefore, the computer has the potential to help disabled persons participate in society on a more equal basis.

In particular, Baker (1982) described a new language prosthesis designed for disabled persons who are physically unable to speak or use sign language. Minspeak is a semantic interface that consists of fewer than 50 keys which produce thousands of spoken sentences. Sentences can be activated by fewer than seven keystrokes. Minspeak has implemented a

linguistic coding system in which the sequence of keystrokes defines the context of the message. Baker also describes the development of Minspeak, the system functions, hardware components and plans to expand the system.

Craig (1982) examined the feasibility of using the tactile sense as an alternative modality for the perception of speech and the understanding of spoken language. Natural and synthetic speech tokens are presented to the skin of the fingers using a computer-controlled, spectral display and Optacon transducers. Training procedures for the acquisition of speech provided through touch are also being developed and evaluated. A novel training paradigm is examined that takes advantage of the close association between speech production and speech perception by allowing the learner of tactile speech to produce, hear and feel his or her speech patterns in real-time. The results of these experiments have broad implications for the development and improvement of speech aids for deaf individuals and aids for perception and production of speech.

The computer could eventually be indispensable for assisting disabled individuals in adapting to their home environment. Ramey, Johnson & Aylor (1981) used the computer to generate several independent living aids: computer-controlled wheelchairs, prosthesis, manipulators, and environmental control systems. This menu-driven system can answer the telephone, operate a television, turn appliances on and off, prepare typewritten material, interact in a video game mode, teach mathematics, vocabulary, and other subjects at home through CAI, and provide access

to other systems through networking. Obviously, computers can provide flexible, cost-effective solutions to a wide range of at-home problems faced by disabled individuals.

OBSERVATIONS AND RECOMMENDATIONS

Observations

Computer technology has had an appreciable, positive effect on the vocational rehabilitation system in America. Computers facilitate the work of the counselor, help manage the vast resources of the system, train and educate disabled individuals and those who serve them, and help disabled individuals perform the myriad of tasks necessary for daily living. Yet, in spite of these advances, some professionals in the field (e.g., Leneway & Montgomery, 1981) feel that the benefits of computer technology have only begun to be realized. It is heartening to know that the field of rehabilitation is involved actively in this frontier and perhaps will reap its numerous benefits. But, what are the future applications and advantages of increased computer technology, and what kinds of research and demonstration projects need to be conducted to enhance that growth?

From the preceding analytical review of the literature, the author postulates that each area covered will be profoundly influenced by computers.

Counseling Process

Counselors will be freed from the voluminous amount of paperwork and will be able to spend more time counseling. They will, in effect, become less of a service coordinator, and more of a counselor. In addition, clients will be able to do more for themselves relative to their resume writing and career selection. For example, computerized

occupational information systems will proliferate and become quite commonplace.

Agency Management

The vocational rehabilitation system in America will become at least more efficient and probably more effective as management/supervisory personnel become competent in the use of computers. Computer-generated simulation models will assist continually in the agency decision-making process. In fact, to facilitate agency management and client information, every administrator will have a desktop computer terminal.

Training and Education

Nowhere will the benefits of learning with computers be more dramatic than with disabled learners. Those clients whose physical limitations have been a barrier to an education will find themselves benefitting from training at home and at school.

Consumer Concerns

The life expectancy and quality of life for disabled individuals will continue to improve. Computers and software will become more affordable and adaptable as advances are made in computer technology.

Recommendations

To achieve these expected outcomes a variety of research projects and training programs should be implemented. For example:

1. A study should be funded to examine the many existing computer-based occupational information systems and determining the relative advantages and disadvantages of each when combined with variables

such as the rehabilitation setting, disability type, economic resources, etc. The results of this study should be widely disseminated in a form useful to rehabilitation personnel. Such information could provide a base for agencies and workshops to make decisions regarding the most appropriate occupational information system for their facility.

2. A mechanism should be developed to motivate vocational rehabilitation agency personnel to utilize desktop computers to assist in agency management activities. Use of these computerized tools will yield more efficient management capabilities as well as increased productivity. Secondarily, rehabilitation professionals should be motivated to utilize the computer in formulating the IWRP.
3. Federal initiatives should increase the interaction between those developing computerized resources and disabled persons. As in the recent President's Private Sector Initiative, computer manufacturers and disabled representatives should meet to insure that the needs of disabled persons are incorporated in the design stage rather than as an afterthought. These initiatives should encourage the private sector to be more proactive in responding to the expressed needs of disabled individuals.
4. In developing placement opportunities for disabled clients, rehabilitation professionals should be stimulated to consider non-routine placement possibilities within the emerging "high technology" industry. As employment opportunities increase in the field of computers, vocational rehabilitation professionals must

have the financial resources to assure their disabled clients are well trained to receive and maintain the variety of jobs available from the computer industry. Indeed, this industry holds great promise for the potential employment of a variety of disabled persons including homebound individuals.

5. Opportunities for training rehabilitation personnel in computer sciences and information management must be forthcoming and supported by federal/state initiatives. Computer and information management components must be built into the graduate education program for rehabilitation students. Professionals in the field should be stimulated to participate in a variety of in-service training programs to allay their fears and apprehensions regarding the computer's capabilities. Models of effective training mechanisms should be explored and replicated and wide dissemination of computerized resources should occur. An evaluation and feedback component should be included in all training programs to insure they meet the agreed upon goals. In-service training programs should be designed with an extensive follow-up component in order to provide professionals with continuing support and technical assistance in their application of the computerized resources.
6. Research components should continue to investigate, design, adapt and develop computerized applications of products to aid in rehabilitation and independent living. Federal involvement in new discoveries however must not stop at the design stage. New designs and products must move efficiently from the drawing board into the

lives of disabled persons. In order to accomplish this, the federal government must promote widespread dissemination activities that are geared toward rehabilitation professionals and disabled persons as well as information sharing between researchers. As the number of information sources expands, the federal government must take a lead role in coordinating these information systems in order to avoid duplication and information overload.

Applying computer technology to the field of vocational rehabilitation is limited not by the technology, but rather by the lack of resources and imagination. The author of this paper is firmly convinces that the rehabilitation community will continue to use computers to help the people they serve as well as themselves.

ANNOTATED REFERENCE LIST

COMPUTERS IN VOCATIONAL REHABILITATION:
CURRENT TRENDS AND FUTURE APPLICATIONS

ANNOTATED REFERENCE LIST

COUNSELING PROCESS

Bax, D. D. Computer programmer aptitude-test for the totally blind. Journal of Rehabilitation, 1982, 48(3), 65-68.

Developed by the staff of the Jewish Guild for the Blind, this article describes an instrument to measure the aptitude of totally blind individuals to perform as computer programmers.

Crawford, J. L. Computer support and the clinical process: An automated behavioral rehabilitation system for mentally retarded persons. Mental Retardation, 1980, 18(3), 119-124.

The behavioral rehabilitation system described in this paper provides a structure for client assessment, treatment selection, and treatment plan documentation update. The use of computers to provide clinical staff with information to assist with the client management process is discussed.

Fowler, Raymond D., Jr. Automated interpretation of personality test data. In James N. Butcher (Ed.). MMPI: Research Developments and Clinical Applications. New York: McGraw-Hill, 1969, pp. 105-126.

Describes how the computer can be used to score and assist in the interpretation of personality test data which yields a clinical diagnosis.

Gandy, R. J. An enquiry into the mental health inquiry. British Journal of Psychiatry, 1979, 135, 531-534.

Reports on study of a computerized information system on mental illness and mental disability run by the Department of Health and Social Security, Leicestershire, England. Results indicate that some of the data is of questionable value, particularly in the area of specific diagnosis.

Kruger, R. Occupational information systems and their use in rehabilitation. Washington DC: Rehabilitation Services Administration, 1980. (ERIC Document No. ED179823)

New technology in the rehabilitation area includes computerized occupational information systems used to aid vocational planning. Service listings are included with the degree of development and emphasis varying from state to state. Overall positive impact of such systems is acknowledged.

Kruzas, A. T. (Ed.). Medical and health information directory: Guide to state, educational institutions, hospitals, grant-awarded sources, health-care delivery agencies, journals, newsletters, review serials, abstracting services, publishers, research centers, computerized data banks, audiovisual services, and libraries and information centers. Detroit, MI: Gale Research Company, 1977.

Directory provides comprehensive information on more than 12,000 agencies, associations, companies, institutions, publications, and services in medicine and health. Lists coverage services.

Mallik, K., & Sprinkle, J. System approach in vocational rehabilitation agencies with a new look. Rehabilitation Literature, 1977, 38(5), 138-142.

Focuses on effective methods of enhancing job placement skills in serving severely disabled clients. Possible alternatives for saving counselors' time in initial client contact and developing client job seeking skills are discussed. The experimental job development laboratory program now in operation is described, and data from the program presented and analyzed. The preparation of a computer software package that will provide data to rehabilitation agencies is described and contacts provided for those interested in receiving this software package.

Masciocche, C., Erdman, W. J., Brady, S. J., & Greenspun, B. Computerized assessment model for rehabilitation patients: Benefits, problems, solution. Gerontologist, 1982, 22, 134-135.

Describes the design and implementation of a computerized assessment system for rehabilitation patients. The development of this system was keyed to maximum participation of the entire staff to reinforce the concept of the rehabilitation team. Structured assessment schedules are discussed including application and content. The longitudinal approach to this system is presented. Revisions are included.

McGuire, G. M. The development of a computer assisted vocational guidance system for use in rehabilitation counseling (Doctoral dissertation, West Virginia University, 1981). Dissertation Abstracts International, 1981, 42(3), 1012A. (University Microfilms No. 8118393,167)

A study was conducted to select and evaluate a vocational abilities test and an occupational interest test for use in client assessment. In addition, a computerized vocational guidance delivery system for use in rehabilitation counseling was constructed. As a result of field testing with disabled persons, the California Occupational Preference System (COPS) and the Career Abilities Placement Survey (CAPS) were selected as the best choices for vocational evaluation.

Milligan, W. L. Computer controlled oral test administration: A method and example. Educational and Psychological Measurement, 1978, 38(3), 823-828.

Describes the hardware and control program software which were developed to implement the automatic oral test administration on a DEC PDP 11 computer. Design of a computer tape recorder permits automatic oral administration of true/false or multiple-choice tests. The method is illustrated by an extended example that describes automatic oral administration of the Minnesota Multiphasic Personality Inventory.

Overby, C. M., Myer, T. H., Hutchison, J., & Wiercinski, R. Some human factors and related socio-technical issues in bringing jobs to disabled persons via computer-telecommunications technology. Human Factors, 1978, 20(3), 249-64.

Explores several human factors and other issues associated with taking jobs to disabled persons using computer-telecommunications technology and systems. Discusses general concepts of the transportation-communications tradeoff and legal and institutional dimensions of employed disabled persons. Suggests a variety of research and application needs with a human factors emphasis.

Phillips, S. H., & Russell, Y. S. Development of prototype equipment for innovative employment of blind and partially sighted persons. Journal of Medical Systems, 1980, 4(2), 215-216.

Sensory Aids Foundation of Palo Alto, California has funded development of a number of microprocessor-based or computer-related sensory aids to enable blind and partially sighted persons to enter innovative areas of employment previously inaccessible to them.

Three of these devices are discussed. A new grant has allowed expansion of services to develop computer-related jobs for blind, deaf, and orthopedically disabled persons.

Richards, J. S., Wilson, T. L., Fine, P. R., & Rogers, J. T. A voice-operated response unit for use in the psychological assessment of motor impaired subjects. Journal of Medicine, Engineering, and Technology, 1982, 6(2), 75-7.

Describes the development of a voice-operated response unit using existing microprocessing technology. The unit enables the vocal recording of answers to the Minnesota Multiphasic Personality Inventory, which could not be completed in standard paper-and-pencil format by persons with impaired hand function.

Rose, P. H. Development of a plan for providing career information for handicapped students: An analysis of occupational descriptions for the handicapped (Final report). Washington State University Press, Olympia, WA: 1976. (ERIC Document No. ED134791)

Information concerning job characteristics and employment skills for physically disabled individuals were provided for 227 occupations contained in the Washington Occupational Information Service Career Information System. The 227 occupations analyzed for the study indicate the feasibility of employing disabled persons as well as the aptitudes needed for disabled persons to be successful on the job. Includes software book covering information on 227 occupations, career counselor evaluation, and bibliography.

Roy, E. J. Neurometrics: Quantitative electrophysiological evaluations. Electroencephalography and Clinical Neurophysiology, 1977, 43(4), 552.

Demonstrates how the computer is practically indispensable for the quantitative evaluation of sensory, perceptual and cognitive processes by the medical field which rehabilitation-related. Without benefit of the computer, many modern-day medical evaluations which are quite complex and varied but nonetheless crucial to rehabilitation planning, would not be feasible.

Silence, J. O. A career exposure program for the physically handicapped: Computer programming. Sigcaph Newsletter, 1982, No. 30, p. 11-14.

Explores computer programming as a career for disabled persons, based on a career exploration course for physically disabled high school students developed by the Perdue School of Engineering and Technology at Indianapolis.

Stephenson, H. E., Jr. Spontaneous regression of cancer evaluated by computerized data. National Cancer Institute Monograph, 1976, 44, 43-47.

Demonstrates computer versatility and usefulness in assisting the clinician to render a diagnosis based on a multitude of client-based information resources.

System for helping disabled people get jobs by matching their physical capabilities with manual requirements. Computer Weekly, February 1979, 11(7), 15.

Sixteen pieces of equipment have been designed which test specific basic capabilities such as reaching, grasping, and positioning objects. The computer is a useful tool for storing and retrieving detailed information of this type on each person. Includes discussion on the next step of project which is a detailed assessment of the manual requirements of tasks in facilities and offices.

Weiss, D. J. Computer-assisted synthesis of psychometric data in vocational counseling. Washington, DC: Social and Rehabilitation Service, 1968. (ERIC Document No. ED025787)

Proposes computer assistance in the synthesis operation of vocational counseling. The computer would produce probabilities of job satisfactoriness based on an individual's vocational abilities and ability requirements of various occupational environments. Also presents individualized assessment techniques which could be used with computer assistance.

Young, M. E. Intelligence testing (A bibliography with abstracts) Springfield, VA: National Technical Information Service, 1976.

Reports on the administration of intelligence tests, including test construction, computer-based tests, nonverbal tests, drug-related results and methods of adapting standard tests to the special needs of the armed forces, disabled and disadvantaged persons, and ethnic groups. The bibliography contains 143 abstracts.

AGENCY MANAGEMENT

Bartholomaw, J. J. Applying computers in social service and mental health agencies: A guide to selecting equipment, procedures,and strategies. Rehabilitation Literature, 1982, 43(10), 313-313.

Discusses the application of the computer and appropriate types of equipment, as well as custom-designed programs and equipment.

Bennett, R. E. Applications of microcomputer technology to special education. Exceptional Children, 1982, 49(2), 106-113.

Article presents a sampling of the many new applications of the microcomputer and related technology to special education administration, assessment, instruction, related services, and staff development. Presents computerized learning system.

Eighth Institute on Rehabilitation Issues. Computer assisted rehabilitation service delivery. West Virginia Research and Training Center, 1981.

Study to identify and describe the major ways computers are currently being used to assist service delivery in state vocational rehabilitation (VR) agencies; the uses of computers which could be adapted to VR service delivery needs; the major elements of computers, including hardware, software and personnel in simple terms; guidelines for planning and developing new or expanded computer systems within a VR agency; and problems, fears and apathies often associated with computers.

Lehrer, B. E., & Daiker, J. F. Computer-based information management for professionals serving handicapped learners. Exceptional Children, 1978, 44(8), 578-585.

Discusses the basic design of Ohio's HELPS computer-based information management system, the technical and nontechnical factors that were taken into consideration in its development, and the major results of its field testing in special education settings. Generic issues relating to the use of computer-based information management systems for designing individualized education programs for disabled and nondisabled learners are elaborated.

Lowitt, J. Investigating the twenty year lag in the vocational rehabilitation process. Paper presented at the Fourth International Association of Rehabilitation Facilities Conference, Miami Beach, Florida, 1973. (ERIC Document No. ED085490)

Presents model workshop of the future which would use a centralized computer and automated business center to train clients and perform supportive tasks for other facilities. Discusses related processes which could supplement work.

Minick, B. A., & School, B. A. The IEP process: Can computers help. Academic Therapy, November 1982, 18(2), 141-148.

Discusses ways that computers can alleviate the recordkeeping responsibilities involved in the design and assessment of Individualized Education Programs (IEP). A computerized student academic tracking and resource retrieval system is outlined which provide a computer-generated IEP specific skill information link to available instructional materials. This allows for timely and accurate decisions about each student's IEP and his or her progress. Educational design and computer software/hardware are discussed.

Pettingill, P. A computer-based data management system in a university clinic giving long-term outpatient care to handicapped-children. Developmental Medicine and Child Neurology, 1982, 24(2), 245-245.

A study of computer-assisted medical records and diagnosis.

Schiffman, G., Tobin, D., & Cassidy-Bronson, S. Personal computers for the learning disabled. Journal of Learning Disabilities, 1982, 15(7), 422-25.

The use of computers in the field of special education is discussed in terms of barriers to implementation, suggested solutions, and usefulness in managing the Individualized Education Program.

Senn, James A. Information systems in management. Belmont, CA: Wadsworth Publishing Company, 1978.

Explores the ways in which computer-based information systems can be used by management to more effectively and efficiently monitor agency production.

Warren, C. G., Smith, R. W., & Lehmann, J. F. Computer-applications in documenting patient progress in rehabilitation. Archives of Physical Medicine and Rehabilitation, 1982, 63(10), 506.

Reviews the use of computers to assist counselors in documenting patient progress in rehabilitation, and the technical systems required.

TRAINING AND EDUCATION

Aeschleman, S. R., & Tawney, J. W. INTERACTING: A computer-based telecommunications system for educating severely handicapped preschoolers in their homes. Educational Technology, 1978, 18(10), 30-35.

Describes the development of nontraditional alternatives to classroom instruction to serve the most severely disabled students, specifically a prototype computer-generated telephonic transmission system. Potential uses are yet to be developed. Suggests alternate systems.

Anderson, D. O. Microcomputers in education. Journal of Learning Disabilities, 1982, 15(6), 368-369.

Introduces a series of articles on the use of microcomputers in education, specifically with disabled populations. Related articles are listed.

Calbourn, M. J. Computer-guided diagnosis of learning disabilities: A prototype. Master's Thesis, University of Saskatchewan, 1982.

Describes and evaluates computer-based diagnostic system to assist educators in assessing the reading skills of learning disabled children ages 8 to 10. The system provides a diagnostic report of its findings including areas and skills which require remediation or further assessment. Details the model on which the educational diagnostic process is based.

Carman, G. O., & Kosberg, B. Educational technology research: Computer technology and the education of emotionally handicapped children. Educational Technology, 1982, 22(2), 26-30.

Reviews a study determine the effects of providing special education teachers with computer programs to aid them in developing appropriate math education programs for their students. The experiment demonstrated that the math learning rate could be accelerated, but not whether the accelerated rate could be maintained. References are included.

Crowther, D. K. The microcomputer in special education: Its power and

potential. Provo, Utah: Brigham Young University, 1982.

Identifies the importance of the microcomputer in the teaching of learning disabled children. The uses of microcomputers in the special education classroom are discussed including multisensory presentation, repetition, rapid change for learners with short attention spans, feedback, and the patience of the computer. Examples of programs already written or in development are used.

Debonis, D. M., et al. Education's new alphabet: ALPHANUMERIC, BYTE, CHIP. Academic Therapy, 1982, 18(2), 133-140.

Learning disabled, educable mentally retarded, trainable mentally retarded, and gifted students (fifth through eighth grade) participated in a supplemental computer-assisted project in a Pennsylvania school to improve skills in the areas of computation, concept development, problem solving, and application. Results are discussed.

DuCharme, S., Storm, A., & Kelley, T. Computer as a perceptual retraining tool. Archives of Physical Medicine and Rehabilitation, 1978, 59(11), 527-527.

Discusses the computer as a tool to assist in retraining disabled persons.

Foulds, R. A. Applications of microcomputers in the education of the physically disabled child. Exceptional Children, 1982, 49(2), 155-162.

Describes how microcomputers can serve as expressive communication tools for severely physically disabled persons. Useful features of these computers are summarized in conjunction with recent technological trends such as the portable battery-operated computer.

Geoffrion, L. D., & Goldenberg, E. P. Computer-based exploratory learning systems for communication-handicapped children. Journal of Special Education, 1981, 15(3), 325-332.

Presents a rationale for exploratory learning emphasizing the need for modeling normal communication development. Case studies of severely disabled children using computer-based exploratory systems show that they eagerly involve themselves in the activities and demonstrate skills thought to be beyond their ability by more traditional approaches.

Goldenberg, P. E. Special technology for special children: Computers to serve communication and autonomy in the education of handicapped children. Baltimore, MD: University Park Press, 1979.

Discusses using computer technology to help physically disabled, deaf or autistic children. Includes case studies of disabled children using computers for a variety of purposes.

Gracke, M. A. Computer-assisted instruction for intellectually handicapped children: An evaluation of a modified cloze procedure. Australian Psychologist, 1981, 16(2), 303.

Paper describes computer-assisted instruction in reading. The cloze procedure was introduced as a diagnostic, assessment, and teaching technique at the Wooden Special School and the City Education Clinic in Canberra. Describes results from an evaluative study of a training program using a modified cloze procedure, the advantages of the procedure and implications for the teaching of reading.

Haberman, E. Effectiveness of computer assisted instruction with socially/emotionally disturbed children. (Doctoral dissertation, University of Pittsburgh, 1977). Dissertation Abstracts International, 1977, 8, 1998A. (University Microfilms No. 77-21,221,90)

Discusses the creation of a learning environment for children classified as socially/emotionally disabled. Results reveal that computer-assisted instruction is a novel means of objectively and nonthreateningly presenting instructional goals and provides a means of controlling reinforcement schedules while maximizing the possibility of predicting gains in academic achievement.

Hallworth, H. J., & Breliner, A. CAI for the developmentally handicapped: Nine years of progress. Paper presented at the Association for the Development of Computer-Based Instructional Systems, Washington, DC, 1980. (ERIC Document No. ED198792)

A project between the University of Calgary and the local Vocational Rehabilitation Research Institute which uses computer-assisted instruction to teach social and vocational skills to developmentally disabled young adults, many of whom also had physical disabilities. Presents specific principles of learning and technological devices used in this program and outcomes and successful components.

Hannaford, A. E., & Tabor, F. M. Microcomputer software for the handicapped: Development and education. Exceptional Children, 1982, October 1982, 49(2), 137-142.

Describes computer-assisted instruction for special education classes which include programs for instructional design and technical assistance.

Hansen, D. N., et al. Computer applications laboratory annual progress report. Tallahassee, FL: Florida State University, 1973. (ERIC Document No. ED081214)

Presents the most recent work of the Computer Applications Laboratory (CAL). Includes projects on learning strategies, training strategies, and computer system strategies. Also summarizes federal and state funded projects dealing with computer-assisted instruction (CAI) in social work education, parent counseling, instructional models for individualized technical training, CAI reading programs, and concept acquisition.

Hasselbring, T. S., & Crossland, C. L. Application of microcomputer technology to spelling assessment of learning disabled students. Learning Disability Quarterly, 1982, 5(1), 80-82.

Presents a study, involving 28 learning disabled elementary students, which developed and field tested a microcomputer version of the test of written spelling (TWS) to determine if examiner time and scoring errors could be reduced. Results supported the supposition that a computerized version of the TWS is advantageous for use with learning disabled students.

Interactive home TV helps handicapped students. Computer Decisions, March 1976, 8, 6, 60.

Discusses a pilot program in Amherst, NY, begun in September 1975 which provides instructional alternatives to 100 children who are severely physically disabled, emotionally disturbed, neurologically impaired, chronically ill or hospitalized. Through the use of a computer-based instructional system developed by the Mitre Corporation, children can keep up with classmates or learn at their own pace using materials tailored to suit individual needs.

Jackson, N. M., & Weiler, D. R. The computer assisted computer system. Digital Revolution, 1982, 3, 13-17.

The computer-assisted communication system (CACS) is used to explore

ways of providing communication assistance to speech and motor disabled individuals using a microcomputer and special terminals. The CACS terminal consists of a large typewriter-like keyboard and cathode ray tube display. The terminal is connected to a small self-contained microcomputer which executes programs written to facilitate faster and more versatile communication for a variety of disabled persons.

Katz, L., Johnson, K. P., & Dolby, J. T. Teaching nutrition to the developmentally handicapped using computer-assisted instruction. British Journal of Mental Subnormality, 1981, 27(52), 23-25.

Documents a pilot investigation of the use of computer-assisted instruction (CAI) in nutrition education with developmentally disabled persons. People were successfully trained to categorized individual foods according to their food group. It is proposed that CAI would be a valuable method of teaching comprehensive nutritional skills.

Knutson, J. M., & Prochnow, R. R. Computer assisted instruction for vocational rehabilitation of the mentally retarded (Monograph No. 2). Washington, DC: U.S Department of Health, Education and Welfare 1970. (ERIC Document No. ED044039)

A computer-assisted instructional model to teach educable mentally retarded students how to make change was developed in a 2-year project at the University of Texas at Austin. Development of project and programmatic considerations are presented.

Lally, M. Computer-Assisted education for the intellectually handicapped: The psychologist can make it work. Australian Psychologist, 1981, 16(2), 308-309.

Discusses recent claims that computer-assisted instruction (CAI) is relevant to remedial and special education and argues that the computer-assisted instruction component of educational computer systems for special and remedial education is generally of poor quality.

LeCavalier, D., et al. Putting microcomputer technology to work for our hearing impaired students. American Annals of the Deaf, 1982, 127(5), 512-521.

The use of microcomputer technology for instruction of hearing-impaired students (with or without additional disabilities) is

incorporated in the Hearing Handicapped Program in Jefferson County (Colorado) Public Schools. Applications of its program are listed.

Moyles, L. C., & Newell, J. Microcomputers in a postsecondary curriculum. Academic Therapy, 1982, 18(2), 149-55.

The Learning Skills Program at Cabrillo College, Aptos, California, uses microcomputers to provide diagnostic and instructional services to learning disabled adults enrolled in this community college.

Perera, T. B., & Cobb, E. S. A microcomputer-based learning analysis system for optimizing PSI instructional materials for the visually handicapped. Behavior Research Methods and Instrumentation, 1978, 10(2), 231-237.

Describes a minicomputer-based learning system for optimizing the Personalized System of Instruction (PSI) Materials for the Visually Handicapped. An aural learning laboratory is describe in which visually disabled students learn tape-recorded materials in PSI format while a minicomputer interfaced to the student-operated tape-playback mechanisms collects data on independent study activities. The minicomputer hardware and software system is described and typical learning data are presented.

Rehab Group, Inc. A study of supplementary training available to follow through parents and aides (Final report). Washington, DC: Office of Education, 1980. (ERIC Document No. ED200651)

Describes the planning, implementation, and outcomes of a study of the supplementary training available to follow-through parents and aides. The report discusses the purpose, limitations, and methodology of the study. Results indicate that following supplementary training, participants increased their level of education, experienced a higher rate of employment, improved their economic status through upward job mobility, and increased their personal income.

Rockwell, D. L. Application of task analysis to the design of CAI programs. American Annals of the Deaf, 1982, 127(5), 585-590. Article discusses how task analysis can be applied to the design of computer-assisted instruction programs for disabled students through determining the task specification, identifying decisions and steps, classifying the task according to learning skill, identifying the objectives and entry behaviors, and evaluating achievement of the objectives.

Sandals, P. & Lauran, H. Computer assisted learning for the future: Some practical considerations for research, especially with children and adolescents who have handicaps and/or learning problems. Programmed Learning and Educational Technology, 1975, 12(5), 299-305.

Describes a pilot project using computer-assisted learning at three schools, including a school for deaf persons, a school for multiply disabled children, and a school for children with learning problems. Discusses considerations and problems concerning computer assisted learning.

Schiffman, G., & Tobin, D. Personal computers for the learning disabled. Journal of Learning Disabilities, August-September 1982, 15(7), 422-425.

Discusses the need for educators to become technologically and computer literate in order for disabled students to have access to computers. Barriers include lack of good educational software, lack of evidence supporting effectiveness of computer-assisted instruction, and human resistance to computers.

Swanson, H. L. Strategies and constraints. Topics in Learning and Disabilities, July 1982, 2(2), 79-81.

Conceptual discussion of learning disabilities as automaticity limitation versus strategy deficit.

Teaching applications for computer-assisted instruction (CAI) have proved to be numerous and varied. Modern Data, October 1972, 5, 42-46.

By 1972 about 1,000 CAI facilities had been established at universities, public school systems, industrial centers, and U.S. military training centers. Three of the largest CAI projects are summarized and contrasted to traditionally administered instruction. Restrictions of CAI performance are discussed with recommendations.

Thorkildsen, R. A microcomputer/videodisc system for delivering computer assisted instruction to mentally handicapped students. Logan, Utah: Utah State University, 1982.

Describes a project which is developing and field testing a system to provide computer-assisted instruction to mentally disabled students. Presents a detailed description of the system including

mode of operation. Six instructional programs are being tested.

VDETS 1000: A voice data entry system from Scope Electronics, Inc. Computer World, August 20, 1975, 8, 22.

Quadriplegics and other severely disabled persons can operate a computer vocally, using a terminal device that converts spoken utterances to machine-readable codes. Output codes can be used to enter data into a computer, retrieve stored information, or control machine operations. Components of this system are described.

Watson, P. Utilization of the computer with the hearing impaired and handicapped. American Annals of the Deaf, 1979, 124(5), 670-680.

Paper reviews past, current, and future applications of computer technology to learning and communication problems of hearing-impaired and disabled individuals. Reviews the extent and variety of educational uses of computers including computer-assisted instruction applications. Specific applications of computerized education are presented for various facilities/ institutions serving deaf people.

Weir, S. The computer as a creative educational tool. American Annals of the Deaf, 1982, 127(5), 690-692.

Describes use of the LOGO system, a computer-based learning environment which allows for individualized instruction with many types of disabled students and emphasizes process over product in the solving of problems.

Wilson, M. S., & Fox, B. J. Computer-administered bilingual language assessment and intervention. Exceptional Children, 1982, 49(2), 145-149.

Describes development of microcomputer courseware to provide interactive receptive language testing and training materials for the bilingual, language-disabled child. Describes a prototype program which has been used to test and train language-impaired children.

CONSUMER CONCERNS

Baker, B. Minspeak. Byte, 1982 7(9), 186-202.

Introduces a new language prosthesis designed for disabled persons who are physically unable to speak or use sign language. Minspeak is a semantic interface that consists of fewer than 50 keys which produce thousands of spoken sentences which can be activated by fewer than seven keystrokes. Minspeak has implemented a linguistic coding system in which the sequence of keystrokes defines the context of the message. Describes the development of Minspeak, the way in which the system functions, a description of hardware components, and future plans to expand the system.

Carlson, R., Granstrom, B., and Hunicutt, S. A multi-language text-to-speech module. Proceedings of the International Conference on Acoustics, Speech and Signal Processing. Paris, France: International Society of Acoustics, Speech and Signal Processing, 1982.

Describes demonstration at an international conference of how the computer can be used to facilitate voice generation for the non-communicative.

Craig, James C. Tactile perception of speech. Unpublished manuscript, Indiana University, 1981.

This project examined the feasibility of using the tactile sense as an alternate modality for the perception of speech and the understanding of spoken language. Two major questions are addressed: How should the distinctive elements of the acoustic speech signal be transformed to provide recognizable tactile patterns; and What is the most effective training procedure for tactile reprpesentations of speech? The results of these experiments have broad implications for the development and improvement of speech aids for deaf persons and aids for both perception and production of speech.

Cronk, S. R. & Schubert, R. W. An adaptive computer-aided independent living system for severely handicapped. Biomaterials, medical devices and artificial organs, 1981, 9(4), 356-357.

Discusses a practical evaluation of a general purpose interface

(GPI) for an independent living system for severely disabled persons and using a microprocessor as its central processor.

Custer, D. D. An approach to computer-assisted instruction for the aurally handicapped. Dissertation Abstracts International, University of Michigan, 1971, Ann Arbor, Michigan, No. 71-25814.

An attempt was made to design an interface between an aurally disabled child and a computer to increase the potential of independent learning. Phase I provided for the designing and fabrication of the interface; Phase 2 considered introducing subjects to the use of the console; and Phase 3 was to concern itself with the use of the console in an instructional sequence.

Education-computer-systems and minicomputers. Computerworld, May 1974, 26.

A national computer conference session illustrated the great amount of work that has been done in the area of special equipment over the past year. Three papers were devoted to new devices and systems that allow physically disabled individuals to communicate more effectively with computer systems.

Eifert, F., Griesemer, V., & Piekenbrock, L. Abilityphone terminal adapts to user needs. Twenty-first proceedings of the IEEE Region 5 Conference and Exposition (Emerging technology: A bridge to the century) Colorado, May 3-8, 1982.

Describes Basic Telecommunications Corporation's (Fort Collins, Colorado) Abilityphone Terminal. Discusses its uses as a terminal,environmental control device, expanded telephone service, status monitor, calendar, keyboard, information display, and calculator. Features include keyboard or external switch operation, adjustable information display and response times/rates, removal/replacement of menu items, and user selectable modes of information and alphanumeric display.

Glenn, J. W., & Miller, K. H. Voice terminal may offer opportunities for employment to the disabled. American Journal of Occupational Therapy, 1976, 30(5), 309-312.

Discusses unique opportunities for employment of physically disabled individuals. Studies report the use of voice control as an alternative to mechanical control in the operation of a typewriter keyboard. Evaluation of the vocational potential of this voice

terminal is reviewed.

Gray, R. A., & Masat, L. J. Instructional values of microcomputers for handicapped children. Journal of Educational Technology, 1982, 11, (1), 35-41.

Examines selection criteria as well as specific classroom applications of microcomputers and education of disabled children. Advantages and limitations of microcomputer use with various disabling conditions are discussed.

Haynes, N. A., Moore, W. R., & Martin, A. G. Reliable microprocessor control for drive-by-wire car steering for the disabled. Microprocessors and Microsystems, 1982, 6(7), 361-366.

Discusses the University of Southampton (England) study on the microprocessor control for drive-by-wire car steering for disabled drivers. In a drive-by-wire system the safety of the system depends on the reliability of the electronic components. Illustrates problems and potential solutions.

MacLeod, I. D. Computer-based development of handwriting skills with blind students. International Journal of Rehabilitation Research, 1980, 3(3), 379-382.

Discusses techniques and skill capabilities of the computer to assist blind students in communication.

Marsden, P. A voice emerges from the wilderness (Speech synthesis), Practical Computer, 1982, 5(10), 116-117.

Discusses speech synthesis, computer-peripheral equipment, and the Voxbox. Describes the Voxbox from Mutek and some software it uses to produce intelligible speech. The Voxbox builds speech from individual phonemes stored in the chip, enabling a much more flexible vocabulary to be produced.

Nicholas, W. H. Blind persons in data processing: The attitude of industry. New Outlook for the Blind, 1970, 64(9), 293-296.

From the point of view of one of the first private industries to employ blind persons in data processing, the attitude of industry is presented. Included are the attitudes of top,middle, and line management. Describes ways to overcome negative attitudes.

Odor, P. Microcomputers and disabled people. International Journal of Man-Machine, 1982, 17(1), 51-58.

Studies the rapid growth in available technology and increased opportunities for its use both in specialized communication aids for disabled individuals and also in specialized computer-aided learning packages. Each of these areas of development is wide and needs comprehensive support services while individual programs and aids have only a limited potential number of consumers. Examples of current aids and computer-based teaching methods are given.

Personal computers for the physically disabled: A resource guide. Apple Computer, Inc., 1982, 9 p.

Resource guide describes innovative uses of personal computers by disabled persons. Introduces computers for use in environmental control, communications, education, and entertainment by visually impaired, hearing-impaired, and motor-impaired individuals.

Pollak, V. A. Communication and environmental control system for the severely handicapped based upon a micro-computer. Australia Physician and Engineering Science Medicine, 1982. 5(4), 171-176.

Reviews a communication aid for nonverbal patients with medium to severe impairment of motor coordination for the upper extremities. The device is based upon a commercial low-cost microcomputer with built-in display screen. The vocabulary used contains words and complete phrases which can be accessed by a single-input address.

Ramey, R. L., Johnson, B. W., & Aylor, J. H. Microcomputer-based aid for the handicapped computer programmer. Medical and Biological Engineering and Computers, 1982, 20(5), 640-644.

Discusses computerized instrumentation, programming, patient-care, biomedical equipment, administrative data processing, and disabled computer programming. Describes a device designed to allow a quadriplegic individual to handle the many pages of computer output which must be read and debugged.

Seamone, W. A. New communications technique for the nonverbal person, using the Apple II computer. Bulletin of Prosthetic Research, Spring 1982, 19(1), 28-33.

Describes a technique for nonvocal personal communication for

severely disabled persons, using the Apple II computer system and standard commercially available software diskettes (Visi-Calc).

Semanick, S., & Curtis, C. M. Micros with the handicapped. Computer Journal of Programming Computers, 1982, 4(10), 124-126.

Describes games of skill, sports and entertainment; personal computing disability games; basic computer games; and menus for motor-impaired persons. The basic computer game is described. To make this game more accessible to motor-impaired players, a menu for choices can be presented on the screen with a moving vertical arrow indicating the current choice.

Souther, H. B. Handicapped programming. Computer Journal of Programming, 1982, 4(5), 170-173.

Reviews personal computing for disabled people, interactive-programming, print messages, and basic commands. The review expands to keyboard techniques and special designs.

Vanderheiden, G. Computers can play a dual role for disabled individuals. BYTE, September 1982, 7(9), 136-162.

Discusses microcomputers as tools for rehabilitation, communication, and employment for disabled persons.

Willoughby, K. Working at home: Can computers help. Creative Computers, 1982, 8(3), 58-60.

Describes problems that disabled individuals have finding appropriate employment. Alternate types of employment such as working with computers in the home are presented.

NARIC REHABILITATION RESEARCH REVIEW PROJECT PRINCIPALS

Susan Flowers
RRR Project Director

Freddi Karp
RRR Project Manager

Joan Appel

Alan Biddle

Nancy Colligan

Cheryl Fung

John King

Sharon McFarland

Ed Rorie

Kathryn Thurber

NCRE REHABILITATION RESEARCH REVIEW PROJECT ADVISORY COMMITTEE MEMBERS

Kenneth W. Reagles, Ph.D., Chair
NCRE President-Elect
Rehabilitation Counselor Education
Syracuse University
Syracuse, NY

William English, Ph.D.
Research and Training Center
in Mental Retardation
University of Oregon
Eugene, OR

Jerome R. Lorenz, Ph.D.*
Rehabilitation Institute
Southern Illinois University
Carbondale, IL

John E. Muthard, Ph.D.
Rehabilitation Counselor
Education
University of Florida
Gainesville, FL

George N. Wright, Ph.D.
Rehabilitation Counselor
Education
University of Wisconsin
Madison, WI

*Deceased

NIHR REHABILITATION RESEARCH REVIEW PROJECT REVIEWERS

Lee H. Coleman, Ph.D.
Research Analyst

George A. Engstrom, Acting Director
Office of Information and Utilization

Richard K. Johnson, Ed.D.
Research Analyst

Naomi Karp, Program Specialist
Special Education Rehabilitation

Ellen Liberti
Public Information Officer

Richard P. Melia, Ph.D.
Rehabilitation Program Analyst

RSA REHABILITATION RESEARCH REVIEW PROJECT REVIEWERS

Eunice F. Fiorito, Acting Director
Office of Developmental Programs
Division of Special Projects

Wesley Geigel, Chief
Office of Developmental Programs
Division of Special Projects

Frederick Sachs, Associate Commissioner
Program Operations

Mark Schoob, Chief
Office of Program Operations
Division of Special Projects

Martin W. Spickler, Ph.D., Director
Division of Resource Development

Barbara Sweeney, Program Specialist
Division of Resource Development

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NOTE: Future Role of Rehabilitation Workshops
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